FACE INVESTIGATION

SUBJECT: Construction Laborer Killed When Run Over by Dump Truck in Highway Work Zone

SUMMARY: A 20-year-old construction laborer (the victim) died of injuries he received from being run over by a dump truck in the activity area of a highway workzone. This was a large project, where the main contractor was a bridge-building company and the employer, a road construction company, was a sub-contractor. Road traffic was diverted with a lane shift, so the activity area was free of non-construction related vehicular traffic. The employer was laying a new road at the site of a new freeway overpass. The dump truck driver was self-employed, and was subcontracted by the road construction company to transport and dump loads of gravel on the road construction site. Just prior to the incident, the truck had dumped a load of gravel in the area being prepared for paving. A grader operator was in a grader in line with the path of the gravel truck, waiting for the gravel to be dumped in front of him so he could spread the load. After dumping the load, the truck operator drove forward, lowered the dump box, and began to back up As the truck began to back up, the truck driver steered the vehicle to the left to avoid backing into the grader behind him. The truck's back-up lights and alarms were working, and the driver was watching the mirrors on both sides of the truck. At the time of the incident, the victim was pounding stakes into the ground adjacent to where the truck had been laying the gravel. The changing path of the dump truck brought the victim into the truck's path. The victim, wearing a traffic safety vest, was crouching down with his back to the easterly direction from which the truck was backing, moving west as he pounded stakes. He stepped into the lane where the truck was backing, apparently unaware of the truck's presence. The grader operator glanced to the side, saw the truck as it struck and began to pass over the victim, and tried to alert the truck driver by radio. The signal didn't go through to the driver's radio. At about the same time, the truck driver turned to look forward through windshield and saw the victim's body lying in the gravel in front of the truck. He jumped out of the truck and yelled to other workers in the area to call for emergency services. Although the incident occurred in a metropolitan area, it took extra time for the emergency vehicles to locate the scene and the victim due to traffic changes caused by the construction. The medical examiner pronounced the victim dead at the scene. The FACE investigator concluded that to help prevent similar occurrences, road builders should:

! develop an internal traffic control plan (ITCP) that project managers can use to coordinate the flow of construction vehicles, equipment, and workers operating in close proximity within the activity area, especially on large and multi-contractor jobs.

! design the workflow to minimize backing heavy equipment.

! ensure that a person is designated as a spotter to direct trucks that must back up within highway construction sites.

! consider equipping vehicles with devices to detect the presence of individuals or objects behind backing vehicles.

In addition, EMS providers should**:**

! conduct practice runs to road construction sites that have altered the normal traffic patterns.

INTRODUCTION:

On August 2, 2000, a 20-year-old male construction laborer died when he was run over by a dump truck in a highway work zone. The Wisconsin FACE field investigator was notified of the incident by OSHA on August 3, 2000. The FACE investigator conducted an on-site visit and interviewed the employer's safety officer for the project on August 3, 2000, and later reviewed the death certificate, medical examiner and sheriff's reports.

The employer of the victim in this incident was a road construction company that had been in business for almost 75 years. There were about 45 company employees at the site at the time of the incident, plus an unknown number of workers from other contractors involved with the project. This was a large project, where the main contractor was a bridge-building company and the road construction company was a sub-contractor. The employer had been at the site for four months before the incident. The dump truck driver was self-employed, and had worked at the site for six weeks as a sub-contractor to the road construction company. He had purchased the truck new about three months before the incident, after having driven dump trucks for at least four years.

New employees at the employer's company received job and safety training through a combination of classroom, video, and self-study manuals prior to assignment to work duties and on-the-job training. Training records for the victim indicated he had successfully completed the company's initial training program. The company had a comprehensive written safety program, with a safety officer on the construction site. Jobsite safety meetings were conducted on a weekly basis.

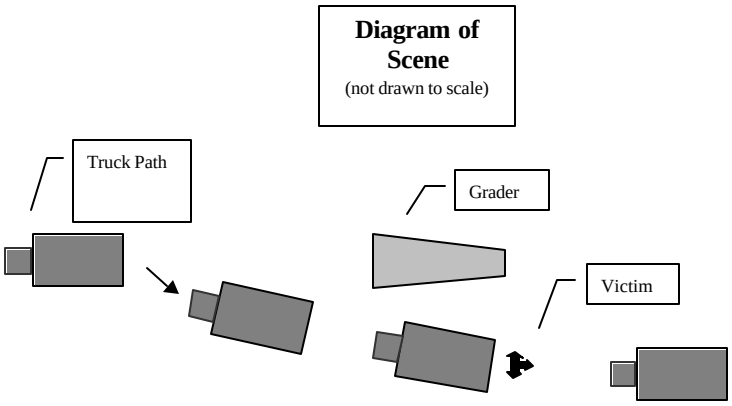
The victim was hired three months before the incident, and had worked at another site for two and a half months. He was a college student during the school year, and was hired by the company for the summer construction season. His father also worked for the company, but was working at another site on the day of the incident.

INVESTIGATION:

The road construction company was building a concrete road at the site of a new freeway overpass. Road traffic was diverted with a lane shift, so the activity area was free of non-construction related vehicular traffic. The dump truck driver was subcontracted by the road construction company to transport and dump loads of gravel on the road construction site. His new truck was equipped with rear view mirrors on both sides, as well as a backup alarm. On the day of the incident, the workers started at about 6:30 AM. Over the next three hours, the truck driver dumped a series of loads under direction of the road builder's site manager. The driver would pick up a load of gravel from the west end of the activity area, drive forward to the east end, dump the load in an area being prepared for paving, then back up to receive another load of gravel. While his truck was being refilled, a grader operator would spread the previous load and waited for the next load to be dumped. The cement layer contracting company was ready to pour cement as soon

as a section of road bed was prepared.

Just prior to the incident, the truck driver dumped a load of gravel, drove forward, lowered the dump box, and began to back up. While backing, the truck driver steered the vehicle to the left to go around the grader behind him. The truck's back-up lights and alarms were working, and the driver was watching the mirrors on both sides of the truck. At the time of the incident, the victim was pounding stakes into the ground adjacent to where the truck had been laying the gravel. The changing path of the dump truck brought the victim into the truck's path. The victim, wearing an orange traffic safety vest, was crouching down with his back to the direction from which the truck was backing, moving in a line as he pounded stakes. He moved into the lane where the truck was backing, apparently unaware of the truck's presence. The grader operator glanced to the side, saw the truck as it struck and began to pass over the victim, and tried to alert the truck driver by radio. The signal didn't go through to the driver's radio. At about the same time, the truck driver turned to look forward through windshield and saw the victim's body lying in the gravel in front of the truck. He jumped out of the truck and yelled to other workers in the area to call for emergency services. Although the incident occurred in a metropolitan area, it took extra time for the emergency vehicles to locate the scene and the victim due to traffic changes caused by the construction. The medical examiner pronounced the victim dead at the scene.



CAUSE OF DEATH: The death certificate listed the cause of death as multiple injuries.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Road builders should develop an internal traffic control plan (ITCP) that project managers can use to coordinate the flow of construction vehicles, equipment, and workers operating in close proximity within the activity area, especially on large and multi-contractor jobs.
Discussion: The ITCP should include management, safety, hazard assessment and control elements, and schematic diagrams that depict the movement of construction workers and vehicles within the work space.
Management elements may address:

- chain of command
- on-site equipment and personnel
- contact information for company workers, contractors, EMS providers
- location, time table and scope of the project
- an operations communications plan that includes:
  - < a plan for orienting independent truck drivers and subcontractors to the work space and the ITCP

- < methods to communicate changes in the ITCP
- < a means for workers on foot to communicate with equipment operators, truck drivers, and those in charge of controlling or coordinating the work flow
- < a means for grader operators, dozer operators, truck drivers and scraper operators to communicate with each other and the prime and sub-contractors.

Safety elements may address:

- identification of the project's ITCP coordinator
- description of the role and authority of the ITCP coordinator
- description of the roles of employees in recognizing, reporting and eliminating safety hazards.

Recommendation #2: Road construction companies should design the work operations to minimize backing heavy equipment.

Discussion: Operating heavy equipment, including dump trucks, in the forward direction provides the operator with a wider view of potential hazards and obstacles. Companies should carefully evaluate environmental and economic barriers to forward operation and select work operations that allow forward driving as much as possible.

Recommendation #3: Road construction companies should ensure that a person is designated as a spotter to direct trucks that are backing up within highway construction sites.

Discussion: When it becomes necessary to back a vehicle within a workzone, a spotter should be positioned in an area with an unobstructed view of the vehicle's intended path. The spotter should receive clear instructions from the ITCP coordinator about the vehicle's route and destination. The spotter and the operator should use pre-arranged methods of communication, including hand signals and/or devices.

Recommendation #4: Heavy equipment owners should consider equipping vehicles with devices to detect the presence of individuals or objects behind the vehicle.

Discussion: A variety of devices are available for use on vehicles to identify and alert operators to the presence of objects or individuals in the blind spots behind a vehicle:

- ! electromagnetic signal detection systems use small electonic tags that are attached to smaller vehicles, workers on foot, and structures in the workzone. The tags delect an electromagnetic signal transmitted from an antenna on the heavy equipment and generate an alarm on the tag and in the driver's cab if a tag enters a present danger area.
- ! infrared detection systems sound a warning in the cab if an object or person is detected in the radar beam.
- ! ultrasonic systems generate ultrasonic waves by a transmitter at the rear of a vehicle, which bounce off the nearest object and return to the rear mounted receiver. A microprocessor calculates the distance between the object and the vehicle, and sounds an alarm when an object is close to the vehicle.
- ! video cameras can be mounted on the vehicle to monitor blind spots to the front, rear and side, with a video monitor in the cab providing the equipment views.

Recommendation #5: EMS providers should develop and maintain external and internal ongoing communication systems to stay informed of altered traffic patterns at road construction sites.

Discussion: Road construction projects may involve changing traffic patterns, including lane shifts and closures. These changes may affect the route and point of access for emergency services to the activity area as well as the road traffic area. A system for communicating the changes to EMS providers should be developed as part of the overall traffic control plan. Providers should develop internal communication systems to update the responders on an ongoing basis. This could include conducting practice runs to sites with complex routes of access to construction scenes.

REFERENCES

Building Safer Highway Work Zones: Measures to Prevent Worker Injuries From Vehicles and Equipment. CDC-NIOSH, Publication 2001-128, April, 2001.